



## PCBs in Groundwater at the Rocky Flats Environmental Technology Site

Certain building basements and concrete rubble backfill at RFETS may have included some PCB-containing paint. EPA instructed the Site to monitor downgradient of where such paint is in contact with groundwater to detect PCBs that may have leached from the rubble (letter from Kerrigan Clough, EPA Asst. Regional Administrator, Ofc. Of Partnerships & Regulatory Assistance, to Joe Legare, DOE RFFO, Ref. 8EPR-F; undated, probably late CY01).

PCB-containing paint was confirmed present in B111 basement and B771. There are no wells at B111 and PCBs are not monitored at B771. In the above-referenced letter, EPA instructed the Site to use modeling results to determine the optimal location and frequency for monitoring groundwater for PCBs downgradient of B111 basement, and to insert resulting, EPA-approved monitoring plan in the IMP.

Report: Risk-Based Approach for In-Situ Backfill of PCB-Based Painted Concrete (KH, July 19 2001):

1. Used upper bounds of hydraulic conductivity (geometric mean of weathered Arapahoe Formation sandstone,  $7.88 \times 10^{-4}$  cm/s; EG&G 1995).
2. Used upper bounds of hydraulic gradient (0.1, from near B881; notes it is 0.02 near B111, the subject area).
3. Used solubility of Aroclor 1254 as estimate of PCB concentration in water (0.057 mg/L; does not consider slow leaching/dissolution rate of PCBs from paint).
4. Does not consider degradation of PCBs.
5. Assumed water in basement immediately accesses painted surfaces and leaching begins immediately, with water discharging through fractures in basement/walls.
6. Used PCB loading rate that is constant over time.

As noted in the report, PCBs migrate approximately 12,000 times slower than the groundwater. The Programmatic Preliminary Remediation Goal (PPRG) for numerous Aroclors for a Residential Groundwater Exposure scenario is 0.0426 ug/L; the PPRG for open space surface water (incidental ingestion) is 5.96 ug/L, and the risk-based Wildlife Refuge Worker Surface Water PRG for Aroclors (which is most appropriate at RFETS) is 38 ug/L. The PQL for all Aroclors is 1 ug/L, per RFCA Attachment 5.

Even under the conservative conditions used for inputs, groundwater transport modeling showed PCBs to be nearly immobile in RFETS groundwater. Over 30 years of leaching, PCB concentrations in groundwater 5 ft from the building are 0.027 ug/L; at 10 ft. and beyond, they are 0 ug/L. These concentrations are well below the PQL of 1 ug/L.

If the groundwater was to seep to the surface at a distance of 30 ft. from the basement, the PQL would not be exceeded until at least 500 years after rubble placement. The nearest downgradient potable domestic use well is at least one mile from any building basement that would have PCB-paint-bearing concrete. This report concludes, "Therefore, the possibility of groundwater ingestion from RFETS is nonexistent." Additional conclusions:

- "The model demonstrates that leaching of PCBs from the paint on the concrete rubble, and subsequent migration in the groundwater is unlikely to occur at RFETS."
- "Based on the transport model it is concluded that the potential for PCBs to be transported, from in-situ backfilling of PCB-based painted concrete in essentially intact building basements, either by groundwater or to surface water, is negligible.... PCB concentrations are not predicted to exceed 5960 ppt [5.96 ug/L, the open space surface water PPRG] in groundwater or surface water at a location 30-ft downgradient of the building within 500 years.... Our conclusion is there are no exposure routes for PCBs by either ground or surface water to humans."
- "The risks associated with leaving this debris in place are minimal, and pose no risk to human health or the environment through the evaluated exposure routes. The PCBs bound in the paint are very stable, degrade and volatilize slowly, and are not released unless in the presence of organic solvents."

EPA's Office of Water states, "If released to soil, PCBs experience tight adsorption.... PCBs will generally not leach significantly in aqueous soil systems...." (EPA's Office of Water Fact Sheet, <http://www.epa.gov/OGWDW/dwh/t-soc/pcbs.html>)

The letter from Kerrigan Clough to Joe Legare states:

The Agency believes that leaving concrete painted with PCB-based paints in the basements of demolished buildings will not pose an unreasonable risk to human health or the environment. The Method of Characteristics (MOC) computer model simulated a worst case scenario for the potential migration of PCBs from the buried concrete. The model predicted that the concentrations of PCB congener 1254 at 5, 10, 20, and 30 feet from the source, are well below concentrations of concern. The use of conservative initial and boundary conditions in the flow field coupled with the very conservative assumption that the PCBs would leach from the paint into ground water at the aqueous solubility limit, and continue to do so at a constant rate over the modeled timeframe all serve to demonstrate that migration of the PCBs will be at a concentration well below that which would present a concern. Finally, it should (be) noted that the State of Colorado considers this material to be inert.

We therefore suggest that there be no monitoring of PCBs in groundwater downgradient of concrete rubble-filled basements.